
INFORMATION TECHNOLOGY

9626/33

Paper 3 Advanced Theory

October/November 2017

MARK SCHEME

Maximum Mark: 90

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2017 series for most Cambridge IGCSE[®], Cambridge International A and AS Level components and some Cambridge O Level components.

© IGCSE is a registered trademark.

This document consists of **13** printed pages.

Question	Answer	Marks
1(a)(i)	<p>Four from:</p> <p>Provides overview of all the testing ...systematic outline of all features/functionality ...continuously checked/updated to reflect risks To prepare/ensure that all aspects of running a test are considered To train those who need to assist with the test/communicate testing regime Provides a mechanism for outlining test needs ...lists limitations ...lists reasons for testing so testing can be effective Ensures that legal issues/regulations are met ...to show regulatory bodies that testing has been carried out/is effective.</p>	4
1(a)(ii)	<p>Eight from:</p> <p>Ensure that the writer of the test plan knows details of work to be taken/is competent in field of activity to be able to: ...define the aspects of the OS to be tested e.g. interface/devices that it will run on ...define test methods/how each part is to be tested/which aspects of smartphone is to be tested ...test OS use of smartphone facilities to ensure functionality ...assign tasks and responsibilities for testing the smartphone features Test functionality of apps on the smartphone with new OS Write a specific app to test specific features of smartphone with OS Test OS with third party apps Test ability to multi-task with apps from third parties/internal apps ...check regulations/legal issues Test that the amount of smartphone memory is sufficient to hold/run the OS.</p>	8

Question	Answer	Marks
1(a)(iii)	<p><i>Eight from e.g.</i></p> <p><i>Benefits:</i> Easy to use as testers do not need to know the inner workings of product ...tester need not know programming languages/how the software has been implemented ...can work through application as would a user Test case can be developed quicker than for white box testing ...testers need only look at GUI ...do not need to discover all the internal paths/routes through software ...tests are done from point of view of a user ...can expose discrepancies in specification Tests can be conducted by independent personnel from the developers allowing for an objective perspective ...ensures the avoidance of developer-bias Test cases can be designed as soon as specification are complete</p> <p><i>Drawbacks:</i> Test cases will be difficult to design as there is no clear test specification Script maintenance may be difficult ...if the user interface is changing during development/changes due to testing Scripts may not work/be fragile when testing GUI may not be the same for different tests GUI rendering may change during development Does not test all internal pathways/all routes through software ...does not fully test the software ...many program paths will be left untested.</p> <p><i>Max 6 for all benefits or all drawbacks. 1 mark is available for a reasoned conclusion.</i></p>	8

Question	Answer	Marks
2	<p><i>Eight from e.g.:</i></p> <p><i>Benefits:</i> High/consistent accuracy in large scale production/consistent results during production Production can be faster than traditional methods Can produce complex products faster/easier than traditional methods CAD can produce the instructions and send to CAM electronically obviating need for manual programming JIT can be used in conjunction with CAM</p> <p><i>Drawbacks:</i> Can be slow for one off products Need a separate CAM machine for each product Software is expensive to develop/maintain Expensive to train users to use the system Errors can affect the whole production.</p> <p><i>Max 6 for all benefits or all drawbacks. 1 mark is available for a reasoned conclusion.</i></p>	8

Question	Answer	Marks
3	<p>Answers/Indicative content <i>Evaluation requires that advantages and disadvantages be discussed and weighed up in importance.</i></p> <p>Answers may make reference to e.g.:</p> <p><i>Document analysis:</i></p> <ul style="list-style-type: none"> less time consuming than other methods/more efficient as it requires data selection rather than data collection many documents are readily available/in public domain documents unaffected by research process documents are stable/do not change due to observer's presence documents can be more exact/precise documents provide wide/broad coverage of topics <p>documents may lack detail as not produced for research</p> <p>documents may be difficult to retrieve/locate</p> <p>documents may be incomplete</p> <p><i>Questionnaires:</i></p> <ul style="list-style-type: none"> relatively inexpensive to administer when large numbers are involved reduced researcher bias questionnaires are familiar to participants data can be collected in a format that is easy to analyse <p>participants may not complete questionnaires/return the questionnaires fully/properly leading to incomplete data</p> <p>questions may not mean the same to all participants</p> <p>may be unclear who has completed the questionnaires</p> <p>unable to develop the questioning further</p> <p>questionnaires can be difficult to formulate</p> <p><i>Observation:</i></p> <ul style="list-style-type: none"> can collect data where/when activity occurs can be unobtrusive can provide 'behind the scenes' information/can directly see the activities can be susceptible to observer bias observed often perform better when watched cannot help understand why people behave as they do/do what they do 	8

Question	Answer	Marks
3	<p>This question to be marked as a Level of Response.</p> <p>Level 3 7–8 marks Candidates will evaluate in detail use of at least two of document analysis, questionnaires, and observation for this research. There will be a reasoned conclusion/opinion. The information will be relevant, clear, organised and presented in a structured and coherent format. Subject specific terminology will be used accurately and appropriately.</p> <p>Level 2 4–6 marks Candidates will evaluate the use of at least two of document analysis, questionnaires, and observation for this research. There may be a reasoned conclusion/opinion. For the most part, the information will be relevant and presented in a structured and coherent format. Subject specific terminology will be used appropriately and for the most part correctly.</p> <p>Level 1 1–3 marks Candidates will describe use of document analysis, questionnaires, or observation for this research. Answers may be in the form of a list. There will be little or no use of specialist terms.</p> <p>Level 0 0 marks Response with no valid content.</p>	

Question	Answer	Marks
4	<p><i>Eight from:</i></p> <p>Bank computer uses the account number #65636373 to access the customer record ...sees that the balance is \$1100 which is greater than \$159... ...bank computer sends a message confirming that there are sufficient funds for the first purchase Retailer confirms the purchase and an EFT message is sent to the bank to transfer \$159 from customer account to retailer account... ...\$159 is subtracted from customer account ...added to retailer account... ...leaving \$941 in customer account Card reader prints receipt showing details of goods including \$159 which is handed to the customer</p> <p>(Bank computer uses the account number #65636373 to access the customer record) ...sees that the balance is \$941 which is greater than \$699... ...\$699 is deducted from customer account ...added to second retailer account ...leaving \$242 in customer account</p> <p>(Bank computer uses the account number #65636373 to access the customer record) Account now has insufficient funds to meet the \$300 request by the retail store's system ...returns a message saying 'insufficient funds' for the purchase ...the \$300 purchase is declined and a printout of the 'declined transaction' notice is printed and given to the customer.</p>	8

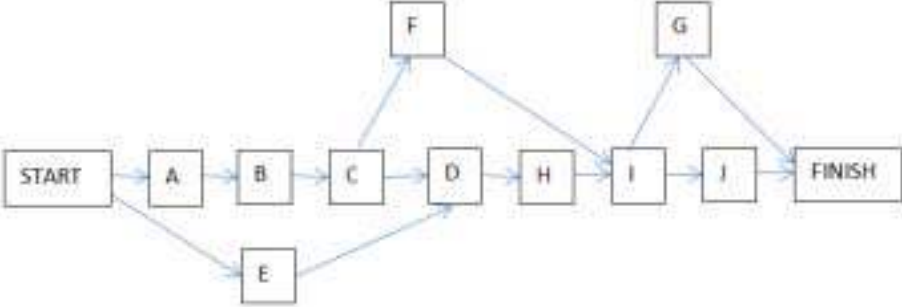
Question	Answer				Marks																																																								
5	A suitable data dictionary would contain the following e.g.:				8																																																								
<table border="1"> <thead> <tr> <th>Field name</th> <th>Data type</th> <th>Field size</th> <th>Other appropriate information</th> </tr> </thead> <tbody> <tr> <td>Customer_ID</td> <td>Autonumber/ Number/Text</td> <td>8/as appropriate</td> <td>Use as Primary Key field</td> </tr> <tr> <td>Title</td> <td>Text</td> <td>4</td> <td>Lookup: Mr, Mrs, Ms, other</td> </tr> <tr> <td>Family_name</td> <td>Text</td> <td>15</td> <td></td> </tr> <tr> <td>First_name</td> <td>Text</td> <td>15</td> <td></td> </tr> <tr> <td>Email_address</td> <td>Text</td> <td>25</td> <td>Validated by picture/format rules</td> </tr> <tr> <td>Postal_address_line 1</td> <td>Text</td> <td>10</td> <td></td> </tr> <tr> <td>Postal_address_line 1</td> <td>Text</td> <td>10</td> <td></td> </tr> <tr> <td>Postal_address_line 1</td> <td>Text</td> <td>10</td> <td></td> </tr> <tr> <td>Postal/ZIP code</td> <td>Text</td> <td>10</td> <td>Validated by picture/format rules</td> </tr> <tr> <td>Country</td> <td>Text</td> <td>10</td> <td>Validated by picture/format rules</td> </tr> <tr> <td>Telephone</td> <td>Text</td> <td>12</td> <td>Validated by presence check</td> </tr> <tr> <td>Date_of_birth</td> <td>Date</td> <td>Automatic</td> <td>Validated by picture/format rules</td> </tr> <tr> <td>Over_21</td> <td>Boolean</td> <td>Automatic</td> <td>Formula: Value derived by checking date of birth is over 21 years ago</td> </tr> </tbody> </table>						Field name	Data type	Field size	Other appropriate information	Customer_ID	Autonumber/ Number/Text	8/as appropriate	Use as Primary Key field	Title	Text	4	Lookup: Mr, Mrs, Ms, other	Family_name	Text	15		First_name	Text	15		Email_address	Text	25	Validated by picture/format rules	Postal_address_line 1	Text	10		Postal_address_line 1	Text	10		Postal_address_line 1	Text	10		Postal/ZIP code	Text	10	Validated by picture/format rules	Country	Text	10	Validated by picture/format rules	Telephone	Text	12	Validated by presence check	Date_of_birth	Date	Automatic	Validated by picture/format rules	Over_21	Boolean	Automatic	Formula: Value derived by checking date of birth is over 21 years ago
Field name	Data type	Field size	Other appropriate information																																																										
Customer_ID	Autonumber/ Number/Text	8/as appropriate	Use as Primary Key field																																																										
Title	Text	4	Lookup: Mr, Mrs, Ms, other																																																										
Family_name	Text	15																																																											
First_name	Text	15																																																											
Email_address	Text	25	Validated by picture/format rules																																																										
Postal_address_line 1	Text	10																																																											
Postal_address_line 1	Text	10																																																											
Postal_address_line 1	Text	10																																																											
Postal/ZIP code	Text	10	Validated by picture/format rules																																																										
Country	Text	10	Validated by picture/format rules																																																										
Telephone	Text	12	Validated by presence check																																																										
Date_of_birth	Date	Automatic	Validated by picture/format rules																																																										
Over_21	Boolean	Automatic	Formula: Value derived by checking date of birth is over 21 years ago																																																										

Question	Answer	Marks
5	<p><i>Eight from:</i></p> <p>Customer_ID included 1 mark</p> <p>All correct/suitable field names for name/family name/title/email address/postal address/date_of_birth 1 mark</p> <p>No spaces in field names 1 mark</p> <p>Postal address split into lines/postal/ZIP code 1 mark</p> <p>Customer_ID used a key field 1 mark</p> <p>Appropriate data types for Customer_ID and Date_of_birth 1 mark</p> <p>Over_21 as Boolean data type 1 mark</p> <p>Appropriate field lengths for all fields given 1 mark</p> <p>Lookup used for title 1 mark</p> <p>Email address/Postal (ZIP) code/DoB validated by picture/format rules 1 mark</p> <p>Over_21 derived by formula from DoB field 1 mark</p>	

Question	Answer	Marks
6	<p>Six from e.g.:</p> <p>Used in design of equipment improved performance of items e.g. running shoes</p> <p>Used in high definition scoreboards/video screen</p> <p>...updated in real-time</p> <p>...can show action on field for better viewing of game</p> <p>Can analyse performance/practice with view in 3D</p> <p>...more detailed results/analysis available</p> <p>...overlays of action for analysis</p> <p>...record performance data with use of wireless devices attached to participants</p> <p>Virtual reality sports/sports online gaming</p> <p>...more people can take part</p> <p>More accurate scoring</p> <p>... due to cameras to record issues and help judges.</p>	6

Question	Answer	Marks
7(a)	<p>Two from e.g.:</p> <p>Default means that this gateway/address is used unless another address is specified</p> <p>Router/computer node that has details of where to forward data packets</p> <p>....if no route known already</p> <p>Device that passes traffic from local subnet to devices on other subnet</p>	2

Question	Answer	Marks
7(b)	<p>Eight from e.g.:</p> <p><i>Benefits:</i> Devices are easier to move around as no wires needed... ...no need to physically connect ...no trailing wires to trip over Greater productivity by home-workers as they can carry laptop/device with them while doing other tasks Ease of expansion with new devices as single access point required ...devices can be added without need to add cables/space for connection/additional hubs/switches ...no need to drill holes/damage house fittings/walls for cables Less expensive than wired connections so no cost of new hubs/switches/sockets/wires</p> <p><i>Drawbacks:</i> Security issues so encryption required which may be difficult to set up Range issues as it is restricted to only 10s of metres from access point ...physical objects may interfere with signal reduced signal strength as distances from access point increases Reliability issues ...subject to interference from other wireless devices/electrical items Speed issues as rate of data transfer is lower than for cabled connections ...may vary during a session leading to poor user experience.</p> <p><i>Max 6 for all benefits or all drawbacks. 1 mark is available for a reasoned conclusion.</i></p>	8

Question	Answer	Marks
<p>8(a)</p>	<p>A suitable activity network diagram would be e.g.:</p>  <p>Eight from:</p> <ul style="list-style-type: none"> A, B, C D, H, I and J shown in correct sequence 1 mark E shown running parallel to A, B, C and D 1 mark F starting at/after C 1 mark F ending before/going to I 1 mark F shown in parallel to D and H 1 mark G shown starting after/from I 1 mark G shown in parallel to J 1 mark All correct arrows 1 mark START and FINISH points shown 1 mark 	<p>8</p>
<p>8(b)</p>	<p>Four from:</p> <ul style="list-style-type: none"> Route 1 A+B+C+D+H+I+J is 3+4+7+2+3+2+4 = 25 Route 2 E+D+H+I+J is 5+2+3+2+4 = 16 Route 3 E+D+H+I+G is 5+2+3+2+5 = 17 Route 4 A+B+C+F+I+J is 3+4+7+6+2+4 = 26 Route 5 A+B+C+F+I+G is 3+4+7+6+2+5 = 27 <p>The critical path is A to B to C to F to I to G at 27 days.</p>	<p>4</p>

Question	Answer	Marks
<p>9</p>	<p>Four from:</p> <ul style="list-style-type: none"> Use options to sort/rank/choose between alternative choices Allows collaborative working/shared documents to reach decisions in a team Use of visual/graphics to present choices Use of IF-THEN/truth tables/'fuzzy' logic to deal with 'partial' truths Use of 'uncertainty' analysis/'sensitivity' analysis for assigning Use of mind-mapping software to show decision-trees. 	<p>4</p>

Question	Answer	Marks
10	<p>Six from e.g.:</p> <p>Cropping of images to remove unwanted areas... ...use of rule of thirds to keep image visual balance ...can lose important detail if poorly used Colour balance adjustment to change 'feel' of image... ...whiter to create warm mood ...bluer to create cooler mood/feel ...restore natural colour to flesh tones Brightness/contrast changes to change appearance of image ...increase in contrast for photos taken on dull days can show more detail ...decrease in contrast for photos taken in bright sun can increase detail in shadows Add a new/missing object/replacing an object in the image ...combining elements of different photos to create a new photo... ...covering/obscuring part of the image with another object Creating a digital illustration/cartoon of the original photo Changing/adding a different/new/fantasy/magical background Create an illusion of depth Create special effects Adjusting the image itself ...change the transparency of an image ...resizing of photos ...reducing noise in the image ..correcting lens distortion/perspective.</p>	6